

# The Physiology of Flowering Plants

## Fourth Edition

This latest edition of *The Physiology of Flowering Plants* has been completely updated to cover the explosion of interest in plant biology. A whole-plant approach has been used to produce an integrated view of plant function, covering both the fundamentals of whole plant physiology and the latest developments in molecular biology. New developments in molecular techniques are explained within practical applications such as genetically modified plants. The book further examines:

- photosynthesis, respiration, plant growth and development;
- nutrition, water relations, photomorphogenesis and stress physiology;
- function, with particular attention to adaptations to different habitats.

Each chapter is fully referenced with suggestions for complementary reading including references to original research papers.

*The Physiology of Flowering Plants* is valuable to both undergraduate and postgraduate students studying plant biology.

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## Contents

Preface *page ix*

<b>Chapter 1</b>	<b>Introduction</b>	1
1.1	Appreciating plants	1
1.2	What kind of plant physiology?	2
1.3	Molecular biology and plant physiology: the integration of disciplines	3
1.4	Outline of the text	5

### Part I Nutrition and transport

<b>Chapter 2</b>	<b>Flow of energy and carbon through the plant: photosynthesis and respiration</b>	9
2.1	Introduction	9
2.2	Energy flow and carbon turnover in the biosphere	9
2.3	Photosynthesis: light absorption and utilization	12
2.4	The fixation of carbon dioxide	18
2.5	Limiting factors for photosynthesis	30
2.6	The efficiency of energy conversion in photosynthesis	32
2.7	Photosynthesis and the increase in atmospheric carbon dioxide	36
2.8	Respiration: the oxidative breakdown of organic compounds	38
2.9	Terminal oxidation and oxidative phosphorylation	46
2.10	Anaerobic respiration	49
2.11	Respiration and plant activity	53

<b>Chapter 3</b>	<b>Water relations</b>	60
3.1	Introduction	60
3.2	Water movement and energy: the concept of water potential	61
3.3	Water potentials of plant cells and tissues	61
3.4	Water relations of whole plants and organs	68
3.5	The transport of solutes in the xylem	85
3.6	Water uptake and loss: control by environmental and plant factors	86
3.7	Water conservation: xerophytes and xeromorphic characters	95

<b>Chapter 4</b>	<b>Mineral nutrition</b>	100
4.1	Introduction	100
4.2	Essential elements	100

4.3 Ion uptake and transport in the plant	106
4.4 Nitrogen assimilation, fixation and cycling	122
4.5 Problems with mineral elements: deficiency and toxicity	128
<b>Chapter 5</b>   Translocation of organic compounds	133
5.1 Introduction	133
5.2 Phloem as the channel for organic translocation	133
5.3 The rate and direction of translocation	139
5.4 Phloem loading and unloading	142
5.5 Partitioning of translocate between sinks: integration at the whole-plant level	146
5.6 The mechanism of phloem translocation	148
<b>Part II Growth and development</b>	
<b>Chapter 6</b>   Growth as a quantitative process	161
6.1 Introduction	161
6.2 The measurement of plant growth	162
6.3 Growth, development and differentiation	163
6.4 Localization of growth in space and time	164
6.5 Conditions necessary for growth	165
6.6 Growth rates	167
<b>Chapter 7</b>   Plant growth hormones	177
7.1 Introduction	177
7.2 Plant growth hormones	178
7.3 Detection and quantification of hormones in plants	191
7.4 How do plant hormones cause responses?	194
<b>Chapter 8</b>   Cell growth and differentiation	205
8.1 Introduction	205
8.2 Meristems and cell division	205
8.3 Mitochondrial and plastid division	211
8.4 Cell expansion: mechanism and control	213
8.5 Cell differentiation	218
<b>Chapter 9</b>   Vegetative development	221
9.1 Introduction	221
9.2 The structure and activity of the shoot apical meristem	221
9.3 Organ formation	225
9.4 Secondary growth	227
9.5 Development of the leaf	228
9.6 The structure and activity of the root apical meristem	239

<b>Chapter 10</b>	<b>Photomorphogenesis</b>	246
10.1	Introduction	246
10.2	The switch from etiolated to de-etiolated growth	247
10.3	Phytochrome and photomorphogenesis	248
10.4	UV-A/blue light photoreceptors (cryptochrome)	255
10.5	Genes controlling etiolated growth	256
10.6	Unravelling photomorphogenesis	257
10.7	Phytochrome signal transduction	263
<b>Chapter 11</b>	<b>Reproductive development</b>	270
11.1	Introduction	270
11.2	Juvenility and 'ripeness to flower'	270
11.3	The control of flowering by daylength and temperature	271
11.4	Plant size and flowering	277
11.5	The regulation of floral induction is a multifactorial process	279
11.6	Floral development	281
11.7	Pattern development in flowers	287
11.8	The formation of pollen	291
11.9	The formation of the embryo sac	293
11.10	Pollination	295
11.11	Embryo formation	301
11.12	Seeds and nutrition	303
11.13	Fruit development	308
11.14	Seed dormancy	310
11.15	Germination and the resumption of growth	315
<b>Chapter 12</b>	<b>Growth movements</b>	318
12.1	Introduction	318
12.2	Nastic responses	318
12.3	Tropisms	320
<b>Chapter 13</b>	<b>Resistance to stress</b>	344
13.1	Introduction	344
13.2	Terminology and concepts	344
13.3	Water-deficit stress	346
13.4	Low-temperature stress	354
13.5	High-temperature stress	362
13.6	Relationships between different types of stress resistance: cross-tolerance	366
13.7	Development of stress-resistant crop plants	368

Appendix	373
A.1 Naming genes, proteins and mutations	373
A.2 Units of measurement	373
A.3 Prefixes for units	375
Index	376

## Preface

The history of this book dates back to the late 1960s, when the publishers Edward Arnold launched a series of student textbooks as the Contemporary Biology series, designed to provide up-to-date texts at elementary university and final-year school level. One of the first authors who was asked to contribute, on the topic of flowering plant physiology, was Professor H. E. Street, then Professor of Botany at the University of Wales, Swansea. He asked one of us (H.Ö.) to collaborate, and the first edition was duly published by Edward Arnold in 1970 under the authorship of H. E. Street and Helgi Öpik, and entitled *The Physiology of Flowering Plants: Their Growth and Development*. The emphasis of the text was on the 'whole plant' aspects of physiology. The second edition followed in 1976 and the third in 1984, although Professor Street sadly deceased in 1977.

While the second and third editions were still very much revisions of the original text, the longer time interval since the last edition, and the rapid pace at which biological knowledge has grown in the last few decades, have now necessitated a very thorough rewriting of large sections of the book, and the task has been quite challenging in the face of an accumulation of facts that on occasion has seemed quite overwhelming. It is not possible now to interpret many aspects of plant physiology without reference to molecular biology, even when one is basically interested in functioning at the organismal level. This applies particularly to the developmental aspects of physiology. Some reorganization of the text and shift of emphasis has accordingly been necessitated, though we have tried to retain the overall spirit of the original book.

One thing has remained unchanged during the preparation of this book from the first edition to the fourth: the unfailing encouragement and help from our editor, Professor A. J. Willis. Without him, the present text would not have been written. We are also grateful for the support of Dr Ward Cooper, Commissioning Editor, and Dr Alan Crowden, Editorial Director, of Cambridge University Press. Thanks are due for reading, and advising on, parts of the manuscript, to Professor Richard C. Leegood, Professor David Read and Dr Julie Gray of the University of Sheffield.

H.Ö. would like to acknowledge the generosity of Professor Ray Waters, Head of the School of Biological Sciences at the University of Wales, Swansea, for use of departmental facilities in preparing illustrations. H.Ö. also would like to thank Ken Jones of the School of Biological Sciences, Swansea, for printing figures; my nephew Kevin Miller and my niece, Heather Nagey, for help with word processing; and Professor Kevin Flynn and Dr Charles Hipkin of the University of Wales, Swansea, for helpful discussions.



We are grateful to all the people who have permitted us to reproduce their published data, and have provided material and helpful advice for figures; particular thanks are due to Professor Jane Sprent and Dr Euan James of the University of Dundee for supplying the original micrograph of bacteroids (Fig. 4.7).